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SITE INVESTIGATION REPORT

Montana Route 35
Mile Marker 5.2 Fuel Spill

5 June 2008

Prepared for:

Keller Transport, Inc.
Billings, Montana



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INTRODUCTION

This is a report of investigations conducted in connection with the Highway 35 Mile Marker 5.2 fuel spill near Polson, Montana. Included are descriptions of activities and results, including descriptions of site hydrogeology and contaminant distribution. A description of a temporary water treatment system now operating at the site is also presented. Monitoring well records, laboratory analytical reports, diagrams of site features, and photographs are provided as attachments. Background information can be found in reports prepared by Cedar Creek Engineering on 9 April and 23 April 2008.

A site location map is provided as Figure 1; Figure 2 is a site plan.

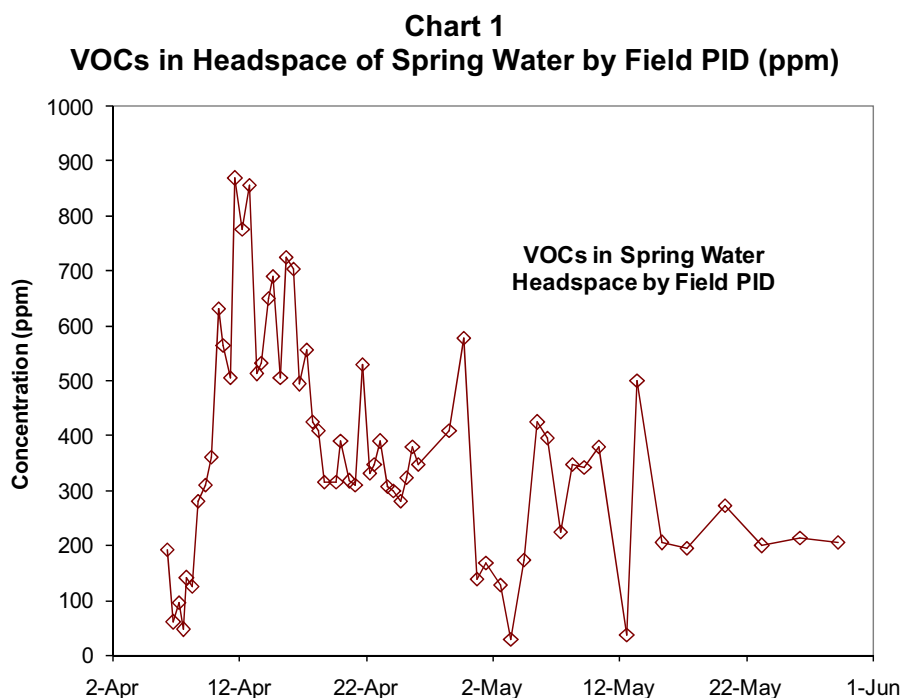
INVESTIGATIVE ACTIVITIES

Investigative activities included field monitoring of springs and seeps, the community supply well, and the sewage lift station; field monitoring of indoor air at five homes in the affected area; laboratory analysis of air and water samples; installation and sampling of twenty-three groundwater monitoring wells; and excavation of four interceptor/observation trenches. The site investigation provides information with respect to local geology, the depth and flow direction of groundwater, and the distribution and movement of gasoline in the subsurface.

Field Monitoring of Springs and Seeps

Field monitoring of volatile organic compounds (VOCs) in springs and seeps, the community supply well and the sewage lift station has been conducted since 6 April 2008. The field monitoring is performed using a PID as follows: a water sample is collected in a 4-oz. jar or in a zip-lock bag; the sample container is filled approximately half full and then sealed. The sample is then shaken and the probe tip of the PID inserted into the container.

Chart 1 below depicts the average headspace value recorded for samples collected from the Kohler and Arnold springs. Other measurements have generally been zero or near zero. The supply well headspace VOC measurement has been zero without exception. A complete summary of the field data is presented in Table 1, in the attachments.



Field Monitoring of Indoor Air

In addition to field water monitoring, field PID measurements have been made of indoor air at the following five homes: Knudson/Rothwell, Sykes/Gates, Jones, Kohler, and Arnold. Chart 2, below, is a tabulation of PID readings recorded at various locations in the houses. Note that seams and openings in the concrete basement floor slab in the Kohler home were sealed on 11 April 2009. At the Sykes/Gates home, a vapor extraction system was installed on 29 April to draw vapors from beneath the floor slab, and the floor openings were sealed on 9 May 2008. The field monitoring was performed principally to ensure that no extreme or dangerous conditions developed in the houses. A degree of variability is present in the data due to differences in venting conditions. These differences were due to persons entering and leaving the houses, as well as the desire to keep the houses ventilated to prevent dangerous VOC buildup.

Chart 2
VOCs in Indoor Air by Field PID (ppm)

	20-Apr	21-Apr	22-Apr	23-Apr	26-Apr	27-Apr	28-Apr	1-May	2-May	3-May	4-May	5-May
Arnold Crawl Space	0.0	3.2	42.0		1.3	0.0						
Kohler Rock Room	0.0	0.0	0.0									
Kohler False Wall	6.7	50.3	111		183	96						
Kohler Elec Panel	111	25.3	32.4		93	127						
Jones Upstairs		0.0	1.1	3.8	6.9	5.6						
Jones Downstairs		0.0	0.5	2.8	7.8	9.3						
Jones Crack in Floor		119	124	751	416	594						
Sykes Upstairs	0.0	0.0	1.0	10.8	0.4	0.5	0.3	0.0	0.0	0.0	0.0	0.0
Sykes Downstairs	0.3	0.0	0.9	12.2	0.3	0.2	12.8	0.7	0.8	0.4	0.5	0.0
Sykes Toilet Supply Line	4.5	25.4	27.4	26.7	11.2	5.1	32.4	0.4	0.6	0.5	0.4	0.0
Sykes VES Blower						48	41	26	150	199	147	170
Knudson Upstairs	0.0	0.0	0.0	0.1	0.7	0.2	0.0	0.0				
Knudson Downstairs	0.0	0.0	0.0	0.1	1.0	0.2	0.0	0.0				

	6-May	7-May	8-May	9-May	10-May	12-May	13-May	15-May	17-May	20-May	23-May
Arnold Crawl Space		1.7	11.8	5.3	0.8		0.0	0.0		0.8	6.8
Kohler Rock Room		1.1	1.3	1.6	1.1		3	1.8	3.4	6.1	8
Kohler False Wall		39.7	39.0	59.6			16.7	25.9	11.6	8.1	18.7
Kohler Elec Panel		238	216	124	1.0		58	101	94	44	94
Jones Upstairs		10.5	12.1	15.1	13.1	10.5		9.4	2.2	2.8	3.5
Jones Downstairs		20.8	20.1	24.2	11.5	13		11.2	3	2.3	4.9
Jones Crack in Floor		101	106	115	10.1	9.5		166	121	22	79
Sykes Upstairs	0.0	0.0	0.0				0.0				
Sykes Downstairs	0.0	0.0	0.1				0.0	0.0			
Sykes Toilet Supply Line	0.0	0.1	0.2		0.0		0.0	0.0			
Sykes VES Blower	142	142	158				190	185			135
Knudson Upstairs								0.0	0.0	0.0	0.0
Knudson Downstairs								0.0	0.0	0.1	0.0

Laboratory Analysis of Air and Water Samples

Air Samples

On 10 April 2008 air samples were collected from the “rock room” in the basement of the Kohler house. Air samples were collected for laboratory analysis from each of the five homes in the study area on 24 April 2008. On 26 and 27 May 2008 air samples were collected for laboratory analysis from various locations in the Sykes-Gates house and Knudson-Rothwell house. Each of the air samples collected were sent for analysis for BTEX (benzene, toluene, ethylbenzene and xylene) and TPH (total petroleum hydrocarbons). Results are summarized in Chart 3, below. Complete laboratory reports are included in the attachments.

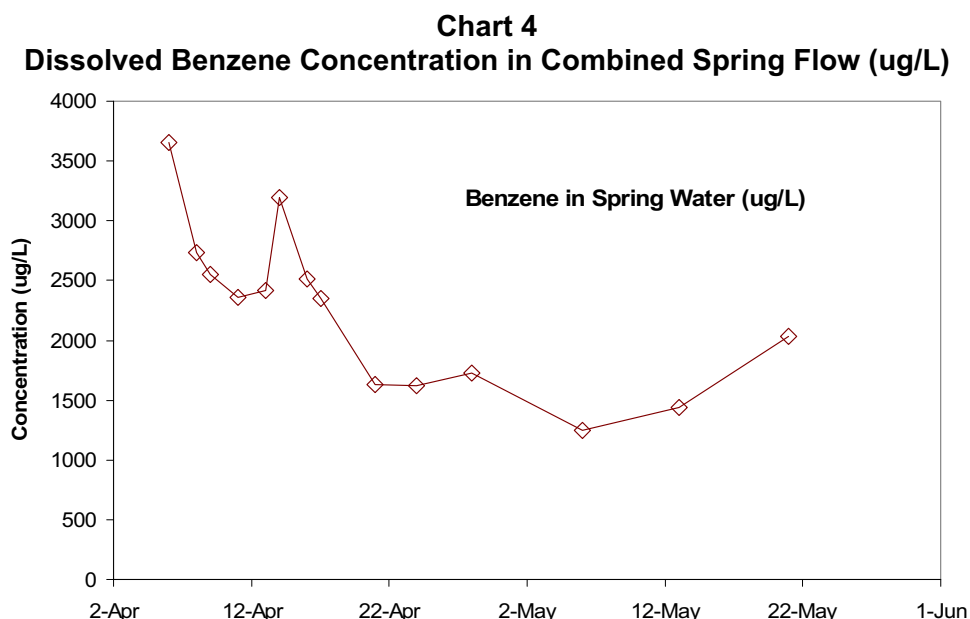
Chart 3
VOCs in Indoor Air by NIOSH 1501 (mg/m³)

ID	Name	Notes	Date	Benzene	Toluene	Ethylbenzene	Xylene	TPH/VOCs as n-Hexane
AS-01A	Kohler	rock room near floor	10-Apr-08	<0.05	<0.04	<0.03	<0.07	<0.22
SS-01A	Kohler	sewer pipe opening in slab	10-Apr-08	0.22	0.39	<0.03	0.07	63.9
P1	Sykes		24-Apr-08	<0.0068	<0.066	<0.065	<0.065	5.7
P2	Knudson		24-Apr-08	<0.0071	<0.068	<0.068	<0.068	0.38
P3	Jones		24-Apr-08	<0.0070	<0.067	<0.067	<0.067	23
P4	Kohler		24-Apr-08	<0.0072	<0.069	<0.069	<0.069	20
P5	Arnold		24-Apr-08	<0.0071	<0.068	<0.068	2.3	<0.072
Bathroom 1	Sykes-Gates	sub-slab VES blower ON	26-May-08	<0.01	<0.03	<0.03	<0.091	<0.25
Bathroom 2*	Sykes-Gates	sub-slab VES blower ON	26-May-08	<0.25	<0.03	<0.03	<0.091	<0.25
Downstairs Bedroom	Sykes-Gates	sub-slab VES blower ON	26-May-08	<0.01	<0.03	<0.03	<0.091	<0.25
Living Room	Sykes-Gates	sub-slab VES blower ON	26-May-08	<0.01	<0.03	<0.03	<0.091	<0.25
Kitchen	Sykes-Gates	sub-slab VES blower ON	26-May-08	<0.01	<0.03	<0.03	<0.091	<0.25
Bathroom 1	Sykes-Gates	sub-slab VES blower OFF	27-May-08	<0.01	<0.03	<0.03	<0.091	0.84
Bathroom 2*	Sykes-Gates	sub-slab VES blower OFF	27-May-08	<0.01	<0.03	<0.03	<0.091	0.79
Downstairs Bedrm	Sykes-Gates	sub-slab VES blower OFF	27-May-08	<0.01	<0.03	<0.03	<0.091	1.8
Living Room	Sykes-Gates	sub-slab VES blower OFF	27-May-08	<0.01	<0.03	<0.03	<0.091	0.82
KR - Kitchen	Knudson-Rothwell		27-May-08	<0.01	<0.03	<0.03	<0.091	<0.25
KR - Laundry Room	Knudson-Rothwell		27-May-08	<0.01	<0.03	<0.03	<0.091	<0.25
KR - Dwn Family	Knudson-Rothwell		27-May-08	<0.01	<0.03	<0.03	<0.091	<0.25

* duplicate

Water Samples

Water samples have been collected on a regular basis from springs and seeps, the supply well, and the water treatment system effluent. Concentrations of hydrocarbons in springs and seeps and system effluent have generally been non-detectable. Chart 4 presents the concentration of benzene in the combined (Kohler and Arnold) springs. Complete laboratory reports are included in the attachments.



Installation of Monitoring Wells

Ten monitoring wells were installed in bedrock in the hillside east of the homes during the period 10 April through 24 April 2008. These wells were constructed of 4-inch PVC well screen and casing and were installed in bedrock, extending to depths of 34 to 80 feet. The wells were installed using an air rotary drill rig and are constructed of 4-inch PVC wellscreen and casing. From 14 through 16 May 2008, fourteen temporary monitoring wells (TW1-TW13 and PW1) were installed in the grassy area between the houses and the lake shoreline. These wells were installed in clay lake sediments and imported clay and gravel fill to depths of 7.5 to 8 feet and are constructed of 2-inch PVC screen and well casing. (PW-1, installed for use in pump testing, is a 4-inch well.) Detailed well logs are presented in the attachments.

Chart 5 depicts benzene concentrations measured on two separate occasions in each of the ten bedrock monitoring wells; Chart 6 depicts benzene levels in the thirteen shoreline wells. Figure 3 is a site plan depicting benzene levels in groundwater. MW4, located on the Kohler property was not sampled in April because it contained free product. Note that MW1, MW3, MW4 and MW8 each exhibited a trace amount of free product immediately following installation (0.01 feet in MW1, MW3 and MW8, and 0.04 feet in MW4). This product was removed using sorbents; presently none of the bedrock wells contain a measureable thickness of free product.

Chart 5
Dissolved Benzene in Bedrock Monitoring Wells (ug/L)

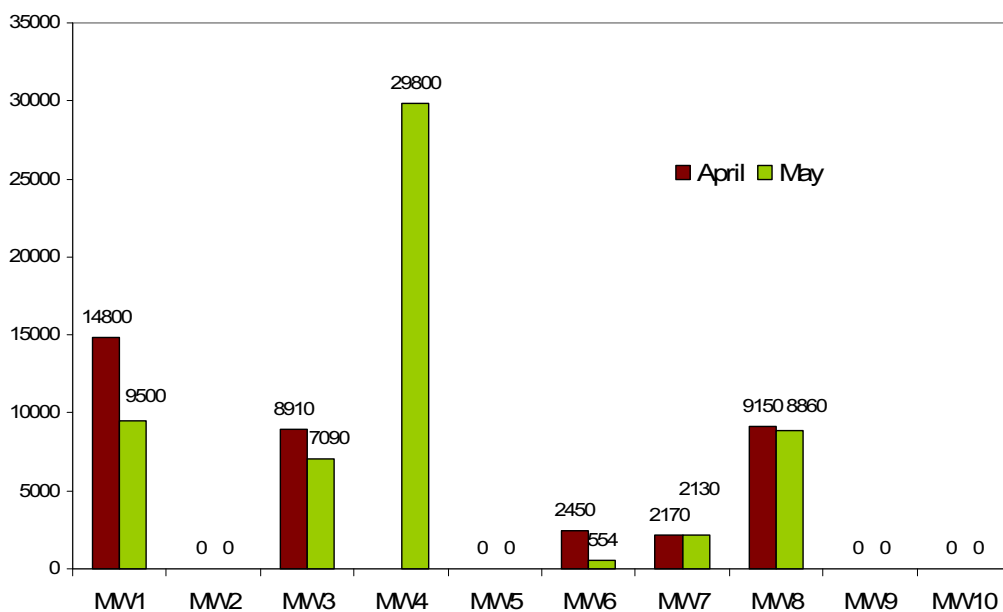


Chart 6
Dissolved Benzene in Shallow Monitoring Wells (ug/L)

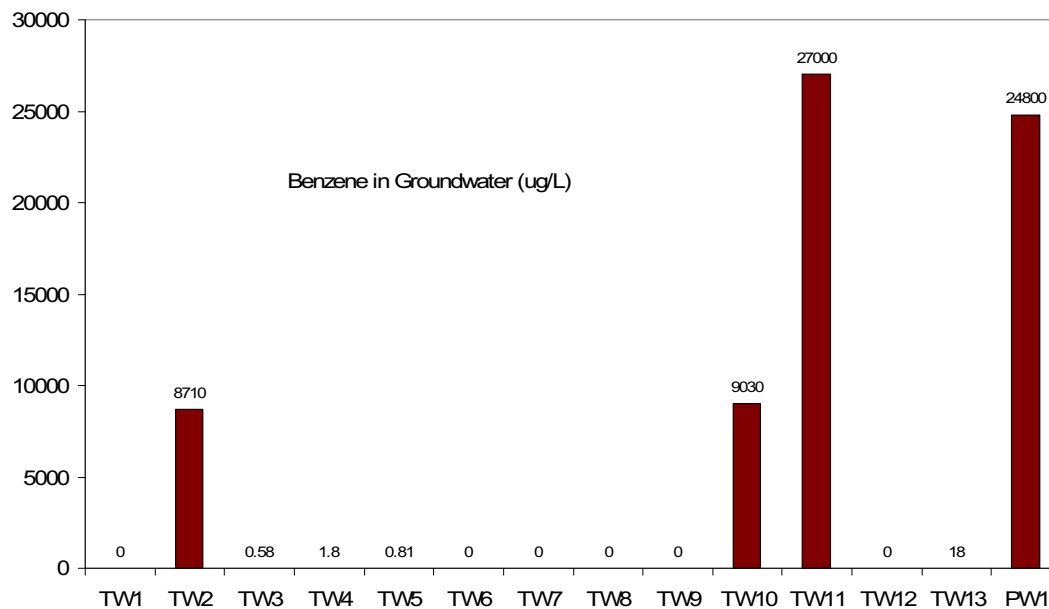


Table 2, included in the attachments, provides a summary of all groundwater analytical data generated to date. Complete laboratory reports are provided under separate cover.

Site Hydrogeology

The subject site is characterized by a steep (18%) slope in the area between Montana Route 35 and the five subject houses. Unconsolidated surface soil composed of gravel and sand is present in this area at thicknesses varying from zero to 10 feet. In the zone to the west of the homes, fill and unconsolidated clay lake sediments are present, and the ground surface flattens as it approaches the lakeshore. A cross-section is presented as Figure 4; the location of the cross-section is shown on Figure 3.

Groundwater is found in the subsurface at depths ranging from less than 1.0 foot in wells in the grassy zone to 27 feet in MW9, installed near the top of the hill. Chart 8 is summary of well and groundwater depth and elevation information. A plot of the groundwater potentiometric surface is presented on Figure 5.

Chart 8
Groundwater and Monitoring Well Elevations

ID	Casing Elevation	Total Well Depth from Grade (ft)	DTW from Casing (ft)	Water Elevation
MW1	2959.71	33.5	22.48	2937.23
MW2	2950.89	80.0	38.55	2912.34
MW3	2952.06	34.0	24.85	2927.21
MW4	2923	42.5	21.08	2901.92
MW5	2926.92	34.5	20.09	2906.83
MW6	2925.96	45.0	21.55	2904.41
MW7	2906.55	50.0	6.05	2900.5
MW8	2828.04	38.5	25.26	2802.78
MW9	not surveyed	50.0	27.48	
MW10	2918.81	42.0	14.31	2904.50
TW1	2898.87	8.0	3.5	2895.37
TW2	2905.83	8.0	9.56	2896.27
TW3	2898.86	8.0	4.5	2894.36
TW4	2902.16	7.5	4.34	2897.82
TW5	2899.31	8.0	5.31	2894.00
TW6	2901.58	8.0	2.6	2898.98
TW7	2900.26	8.0	2.36	2897.90
TW8	2899.37	8.0	0.85	2898.52
TW9	2901.53	8.0	2.78	2898.75
TW10	2902.09	8.0	3.98	2898.11
TW11	2898.72	8.0	2.09	2896.63
TW12	2898.81	3.5	3.32	2895.49
TW13	2898.85	3.5	3.14	2895.71

The groundwater surface is uniform and generally follows the ground surface. The uniformity of gradient across the entire site indicates the presence of a continuous water table. This inference is critical since it supports the conclusion that the liquid gasoline is held above this water surface, and has not migrated vertically below this depth.

The appearance of gasoline odors at the two springs three-and-one-half days after the spill, at a distance of 510 feet, demonstrates a groundwater flow rate of approximately 150 feet per day, an indication of fracture flow. Fractures observed during excavation in the spill area trend to the northwest, supporting the conclusion that fractures in rock provided the primary transport mechanism for the hydrocarbon from the spill origin to the point where the groundwater surface emerges from bedrock.

The surface of the water table emerges from bedrock in the grassy zone west of the houses. This area is marked by distinct differences in vegetation, as well as the two springs in which hydrocarbon contamination has been detected. The subsurface in this zone is characterized by topsoil from <1.0 to 2 feet thick, underlain by clay fill and natural clay lake sediments. Groundwater flow through these clay sediments is very slow, as observed in several open trenches excavated in this area (see trench discussion below). The result of this is that these sediments are saturated, with the water table coinciding with the top of the natural clay layer. Groundwater flow in this zone is thought to occur principally at the interface between the top of the clay and the bottom of the topsoil. Free product was found on the ground surface in this area, at a depression where the topsoil had thinned to less than 1 foot in thickness (also discussed further below).

Free product has been observed in the zone outlined in Figure 6. It is apparent that the free product has migrated relatively quickly through the rock zone, slowing upon contact with clay lake sediments. A portion of the free product has been discharged and recovered at the Kohler pond; discharge there has slowed and only trace intermittent shows of product were occurring there as of 30 May 2008. A portion has discharged and recovered at Trenches 1 and 4 on the Jones property; this flow also slowed following the first several days of significant volume.

Free product remaining in the subsurface is thought to be dispersed throughout the region outlined in Figure 6, held in both rock fractures and shallow soils. The mobility of the free product has been reduced as the product sorbs to soil and rock in these zones. It is unclear whether a sufficient volume of free product remains to result in continued discharge in current areas or discharge in new areas. It is possible that free product will appear in new areas. In particular, past trends and groundwater topography indicate that free product may occur south of the areas where it has been observed to date. While the rapid movement and surface discharge of free product appears to have slowed, dispersion and diffusion of the dissolved hydrocarbon will continue. It is noted that on 27 May, some eight weeks after the spill, seep N143 exhibited contamination above drinking water standards for the first time.

Excavation of Interceptor/Observation Trenches

Four interceptor/observation trenches have been excavated at the site. The locations of these features are shown on Figure 6. Following is a discussion of the trench excavations and a summary of associated free product recovery.

On 13 May 2008, two days after 0.20 inches, and one day after 0.05 inches, of rain fell on Polson, free product was discharged to the ground surface at the edge of the lakebed. On this date, approximately 157 tons of soil was excavated from this area, and Trench 1 was excavated to intercept any additional product which could appear. This trench extended approximately 75 feet in length and was five feet deep. Following excavation, sorbent pads were placed in the trench. Approximately 18 pads were saturated with product (an estimated 3.6 gallons) and removed over the approximately 48 hour period following excavation of the trench. The flow of free product quickly declined, with no measureable quantity of free product appearing after 16 May. Photos of these operations are provided in the attachments.

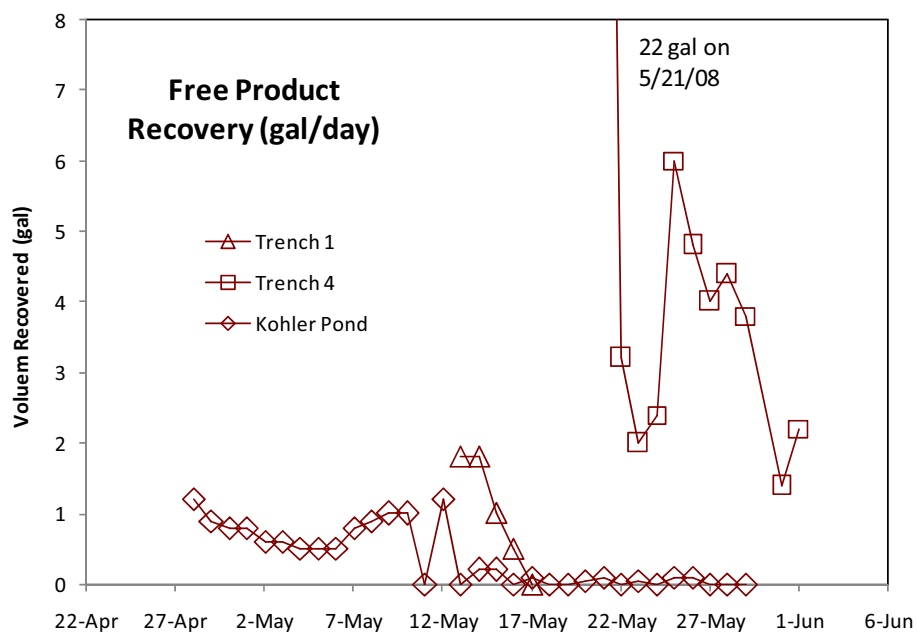
In order to investigate whether or not free product had migrated at depth through lakebed sediments, on 19 May Trench 2 was excavated in the lakebed approximately 40 feet west of the shoreline, extending the north-south distance between the Jones and Kohler docks. The excavation extended 5 to 6 feet in depth. No odor or visual evidence of petroleum was observed in this trench.

On 20 May 2008, 0.26 inches of rain fell on Polson. Out of concern that residual petroleum held in soil immediately east of the shoreline would be mobilized by this rain, on 21 May Trench 3 was excavated on the Jones property, approximately 9 feet east of the shoreline, paralleling Trench 1. Minimal free product (less than 0.2 gallons) appeared in Trench 3 from 21 through 30 May. During the period 24-26 May 2008, approximately 170 tons of contaminated soil in the 9-foot zone between the shoreline and Trench 3 was excavated. The shoreline was then reconstructed with clay and rip-rap to prevent lake water from contacting contaminated soils. Photos of this operation are included in the attachments.

On 21 May, free product was found on the surface in a depression on the Jones property located approximately 60 feet east of the shoreline. Trench 4, approximately 35 feet in length and less than two feet in depth, was excavated in an effort to intercept this product. Over a period of four hours on 21 May, 20 gallons of gasoline was hand-bailed from this trench. From 21 May to 30 May, an estimated additional 34 gallons of gasoline was discharged and recovered at this location.

Free product has also appeared at the small pond on the Kohler property, the source area for the Kohler spring which is being captured and treated. Product was originally observed on 21 April 2008. From 21 April through 12 May, typically 2.5 to 6 saturated sorbent pads (approximately 0.5 to 1.2 gallons of gasoline) were removed each day from this pond. Between 13 and 29 May, an average of less than one-half sorbent per day was removed from the pond. From this, it is estimated that a total of approximately 12 gallons of product was removed from the Kohler pond through 29 May 2008. A summary of free recovery is presented on Chart 9.

Chart 9
Free Product Recovery



Water inflow into all of the trenches excavated in the clay lake sediments was minimal, with less than 100 gallons of water accumulating in Trench 1 over a period of four days, and less than 10 gallons accumulating in Trench 3 over a period of four days. Based on observations made of the open trenches, it is evident that groundwater and free product moves principally in narrow seams and “stringers” at, or just below (<1 foot) the topsoil clay interface.

WATER TREATMENT SYSTEM

On 7-8 April, a water collection and treatment system was put into operation to capture contaminated spring water emerging from springs on the Kohler and Arnold properties. The system was comprised of two 36-inch circular concrete stormwater catchment basins, one to capture the flow of water from each spring. The south spring (Spring 1, the Kohler spring) flows to the north spring (Spring 2, Arnold spring), where a submersible pump equipped with a hi/lo float switch is located. The catchment basins and equipment deck were installed in the lakebed following approval by the Confederated Salish and Kootenai Tribes. The immediately-available (15 cubic foot) carbon units installed 7-8 April were not sufficiently large for long term operation, and an order was placed for larger (40 cubic foot) carbon filters. Because the equipment deck location was below the high water mark in Flathead Lake, permission was obtained from property owners to place a new equipment deck on their land. On 29 April 2008 the larger carbon units were put into operation. These units are the primary treatment component and are backed up by two 15 cubic foot units.

A 1,000-gal septic tank was placed in line between the catchment basins and the carbon filters. This tank was equipped with a regenerative blower to provide air stripping to increase the life of carbon and reduce the potential for carbon failure. The tanks also serve as an oil-water separator in the event free product appears. (Free product has never reached the catchment basins.) A schematic of the treatment system is given as Figure 7.

The volume of water flowing from the springs has been measured periodically and has ranged from 29.0 to 38.8 gallons per minute, or a maximum of approximately 56,000 gallons per day.

Samples of treated effluent have been collected from the system on a frequent basis since the system was put into operation. With two exceptions, effluent quality has remained below National Primary Drinking Water Standards. The system effluent data is included in Table 2.

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ATTACHMENTS

Table 1
Summary of Field PID Screening (ppm)

Sample Date	N Spring	S Spring	Supply Well	N143	S310	System Effluent	Sewage Lift Station	Between Carbons
6-Apr-08	19	367						
6-Apr-08	55	64						
7-Apr-08	105	85						
7-Apr-08	57	35						
7-Apr-08	160	120						
8-Apr-08	122	130						
8-Apr-08	122	440						
9-Apr-08	170	450						
9-Apr-08	317	406						
10-Apr-08	950	315						
10-Apr-08	825	305						
11-Apr-08	500	510	0.0	0.0	0.0	1.5		
11-Apr-08	968	770	0.0	0.0	0.0	3.2		
12-Apr-08	797	755	0.0	0.0		14.4		
12-Apr-08	925	790	0.0	0.0	0.0	0.0		
13-Apr-08	605	420	0.0	0.0	0.0	0.0		
13-Apr-08	720	345		0.0	0.0	0.5		
14-Apr-08	840	460	0.0	0.0	0.0	0.0		
14-Apr-08	700	680	0.0	0.0		0.2		
15-Apr-08	550	460	0.0	0.0	0.0	0.0		
15-Apr-08	790	660	0.0	0.0	0.0	0.0		
16-Apr-08	660	750	0.0			0.0		
16-Apr-08	467	520	0.0	0.0	0.0	0.0	0.0	
17-Apr-08	750	365	0.0	0.0	0.0	0.3	0.0	
17-Apr-08	485	364	0.0	0.0	0.0	0.0	10.1	
18-Apr-08	321	499	0.0	0.0	0.0	0.6	2.4	
18-Apr-08	418	212	0.0	0.0	0.0	0.0	0.0	
19-Apr-08	417	215	0.0	0.0	0.0	1.1	0.0	
20-Apr-08	195	585	0.0	0.0	0.0	1.5	0.0	
20-Apr-08	198	436	0.0	0.0	0.0	10.2	frozen lid	
21-Apr-08	199	420	0.0	0.0	0.0	4.2	0.0	
21-Apr-08	472	589	0.0	0.0	0.0	2.2	0.0	
22-Apr-08	245	418	0.0	0.0		4.4		
22-Apr-08	246	450	0.0	0.0	0.0	20.0		
23-Apr-08	284	494	0.0	0.3	0.3	10.3	0.3	
23-Apr-08	282	332	0.0	0.0	0.0	8.4	0.3	
24-Apr-08	284	315	0.0	0.0	0.0	5.0	0.0	
24-Apr-08	238	322	0.0	0.0	0.0	8.1	0.0	
25-Apr-08	231	417	0.0	0.0	0.0	12.0	0.0	
25-Apr-08	199	560	0.0	0.0	0.0	15.0	0.3	
26-Apr-08	288	409	0.0	0.0	0.0	15.4	0.0	
28-Apr-08	239	580	0.0	0.0	0.0	105.0	0.0	
29-Apr-08	438	720	0.0	0.0	0.0	0.0	0.0	

Table 1
Summary of Field PID Screening (ppm)

Sample Date	N Spring	S Spring	Supply Well	N143	S310	System Effluent	Sewage Lift Station	Between Carbons
30-Apr-08	87	191	0.0	0.0	0.0	0.0	0.0	
1-May-08	144	191	0.0	0.0	0.0	0.0	0.0	
2-May-08	143	114	0.0	0.0	0.0	0.4	0.0	
3-May-08	27	30	0.0	0.0	0.0	0.0	0.0	
4-May-08	101	245	0.0	0.0	0.0	0.0	0.0	
5-May-08	379	469	0.0	0.0	0.0	0.0	0.0	
6-May-08	320	471	0.0	0.0	0.0	0.1	0.0	
7-May-08	205	245	0.0	0.0	0.0	0.0	0.0	
8-May-08	219	478	0.0	0.5	0.0	0.3	0.0	
9-May-08	216	468	0.0	0.0	0.0	0.9	0.3	
10-May-08	386	375	0.0	0.5	0.0	0.4	0.0	
12-May-08	49.6	23.5	0.0	0.0	0.0	0.0	0.0	
13-May-08	191	809	0.0	1.2		1.9		
14-May-08			0.0					
15-May-08	201	208	0.0	0.0	0.0	1.1	0.0	
16-May-08			0.0					
17-May-08	124	266	0.0	0.6	0.0	1.3	0.0	
18-May-08			0.0					
20-May-08	230	315	0.0	0.5	0.0	0.0		
23-May-08	133	264	0.0	0.2	0.0	0.1	0.4	0.1
24-May-08			0.0					
25-May-08			0.0					
26-May-08	162	264	0.0	0.4	0.0	0.1	0.1	0.1
27-May-08			0.0					
28-May-08			0.0					
29-May-08	142	268	0.0	1.2	0.0	0.0	0.0	0.3
30-May-08			0.0					
31-May-08			0.0					
1-Jun-08			0.0					

Table 2
Summary of Groundwater Analytical Data (ug/L)

Lab Report	Sample ID	Collection Date	MTBE	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	C9 to C10 Aromatics	C5 to C8 Aliphatics	C9 to C12 Aliphatics	TPH
H08040110	Arnold Pond	2-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040324	Arnold Pond	21-Apr-08	<50	1620	3500	306	1630	94	847	7700	471	14100
H08040110	Kohler Pond	2-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040324	Kohler Pond	21-Apr-08	<50	3420	6060	437	2330	1590	6130	13800	2720	34200
H08040102	N143	6-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	N143	11-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	N143	13-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040295	N143	17-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040272	N143	16-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040324	N143	21-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040404	N143	24-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040429	N143	28-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050131	N143	6-May-08	<1.0	0.6	0.79	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050296	N143	13-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050384	N143	21-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050438	N143	27-May-08	<1.0	26	39	2.4	18	<1.0	<20	124	11	189
H08040102	S310	6-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	S310	11-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	S310	13-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040295	S310	17-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040272	S310	16-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040324	S310	21-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040404	S310	24-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040429	S310	28-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050131	S310	6-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050296	S310	13-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050384	S310	21-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050438	S310	27-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040102	Spring Composite	6-Apr-08	<50	3650	4760	340	1700	87	811	12600	549	21500
H08040176	Spring Composite	8-Apr-08	<50	2730	4100	332	1650	104	826	11100	506	18600
H08040176	Spring Composite	9-Apr-08	<50	2550	4030	327	1630	103	810	10100	502	17500

Table 2
Summary of Groundwater Analytical Data (ug/L)

Lab Report	Sample ID	Collection Date	MTBE	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	C9 to C10 Aromatics	C5 to C8 Aliphatics	C9 to C12 Aliphatics	TPH
H08040204	Spring Composite	11-Apr-08	<50	2360	3870	378	1670	126	993	9460	259	16700
H08040204	Spring Composite	13-Apr-08	<50	2420	4380	435	1920	136	1200	11700	364	19700
H08040272	Spring Composite	14-Apr-08	<50	3190	5470	293	2140	81	<1000	6480	1310	16500
H08040272	Spring Composite	16-Apr-08	<50	2510	4640	258	1860	73	<1000	5760	1200	14200
H08040295	Spring Composite	17-Apr-08	<50	2350	4390	268	1740	83	<1000	6940	1280	14900
H08040324	Spring Composite	21-Apr-08	<50	1630	3440	309	1600	96	865	7900	447	14300
H08040404	Spring Composite	24-Apr-08	<50	1620	3380	317	1660	99	935	7820	488	14200
H08040429	Spring Composite	28-Apr-08	<50	1730	3910	279	1760	73	806	5340	441	12500
H08050131	Spring Composite	6-May-08	<25	1250	3020	249	1510	73	782	6180	514	11800
H08050296	Spring Composite	13-May-08	<25	1440	3290	328	1700	111	1050	5590	271	11900
H08050384	Spring Composite	21-May-08	<25	2030	4730	397	2420	133	1320	7230	426	16200
H08040110	Supply Well	2-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040102	Supply Well	5-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040102	Supply Well	6-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040110	Supply Well	7-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040176	Supply Well	8-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040176	Supply Well	9-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	Supply Well	10-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	Supply Well	11-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	Supply Well	12-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	Supply Well	13-Apr-08	<1.0	<0.50	0.90	<0.50	1.9	<1.0	<20	<20	<20	<20
H08040270	Supply Well	17-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040272	Supply Well	14-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040272	Supply Well	15-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040272	Supply Well	16-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040316	Supply Well	18-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040316	Supply Well	19-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040316	Supply Well	20-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040324	Supply Well	21-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040355	Supply Well	22-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040390	Supply Well	23-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20

Table 2
Summary of Groundwater Analytical Data (ug/L)

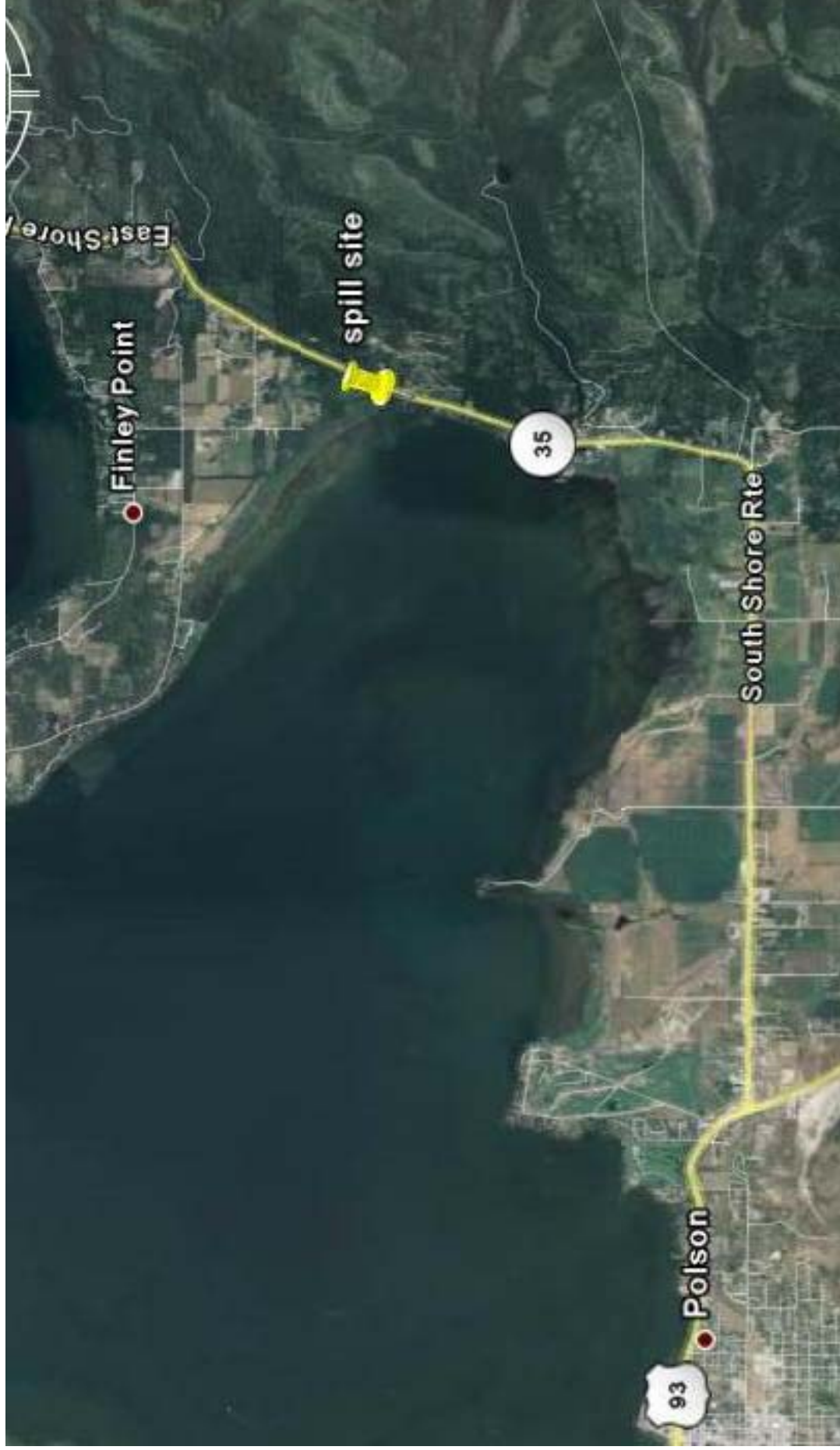
Lab Report	Sample ID	Collection Date	MTBE	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	C9 to C10 Aromatics	C5 to C8 Aliphatics	C9 to C12 Aliphatics	TPH
H08040404	Supply Well	24-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040415	Supply Well	25-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040415	Supply Well	26-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040415	Supply Well	27-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040429	Supply Well	28-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040455	Supply Well	29-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050012	Supply Well	30-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050020	Supply Well	1-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050055	Supply Well	2-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050075	Supply Well	3-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050076	Supply Well	4-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050077	Supply Well	5-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050131	Supply Well	6-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050141	Supply Well	7-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050170	Supply Well	8-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050197	Supply Well	9-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050197	Supply Well	10-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050197	Supply Well	11-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050296	Supply Well	12-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050197	Supply Well	12-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050296	Supply Well	13-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050245	Supply Well	14-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050276	Supply Well	15-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050295	Supply Well	16-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050295	Supply Well	17-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050295	Supply Well	18-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050346	Supply Well	19-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050346	Supply Well	20-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050384	Supply Well	21-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050403	Supply Well	22-May-08	not tested	<0.50	<0.50	<0.50	<0.50	not tested	not tested	not tested	not tested	not tested
H08050438	Supply Well	27-May-08	not tested	<0.50	<0.50	<0.50	<0.50	not tested	not tested	not tested	not tested	not tested

Table 2
Summary of Groundwater Analytical Data (ug/L)

Lab Report	Sample ID	Collection Date	MTBE	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	C9 to C10 Aromatics	C5 to C8 Aliphatics	C9 to C12 Aliphatics	TPH
H08050490	Supply Well	29-May-08	not tested	<0.50	<0.50	<0.50	<0.50	not tested	not tested	not tested	not tested	not tested
H08040270	Supply Line	17-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040176	System Effluent	7-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	333	<20	296
H08040204	System Effluent	11-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	290	<20	257
H08040204	System Effluent	13-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	277	<20	246
H08040272	System Effluent	16-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	174	<20	155
H08040295	System Effluent	17-Apr-08	<1.0	0.39	<0.50	<0.50	<0.50	<1.0	<20	173	<20	155
H08040324	System Effluent	21-Apr-08	<1.0	16	0.51	<0.50	<0.50	<1.0	<20	134	<20	134
H08040404	System Effluent	24-Apr-08	<1.0	66	1.4	<0.50	<0.50	<1.0	<20	248	<20	280
H08050141	System Effluent	7-May-08	<10	643	373	6.7	34	<10	<200	926	<200	1770
H08050296	System Effluent	13-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	37	<20	33
H08050384	System Effluent	21-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050438	System Effluent	27-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	27	<20	24
H08050276	TW1	15-May-08	<1.0	<0.50	0.49	<0.50	<0.50	<1.0	373	37	210	450
H08050295	TW2	17-May-08	<150	8710	13100	1140	4690	130	2520	21600	<3000	45300
H08050276	TW3	15-May-08	<1.0	0.58	1.8	<0.50	1.3	<1.0	44	32	39	105
H08050276	TW4	15-May-08	<1.0	1.8	3.7	0.49	2.9	<1.0	35	23	8.1	65
H08050276	TW5	15-May-08	<1.0	0.81	2.5	<0.50	1.3	<1.0	<20	<20	<20	<20
H08050295	TW6	17-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	21	26
H08050295	TW7	17-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050295	TW8	17-May-08	<1.0	<0.50	0.65	<0.50	0.69	<1.0	<20	<20	<20	<20
H08050295	TW9	17-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050295	TW10	17-May-08	<150	9030	17000	1440	7820	415	4230	36300	797	67100
H08050295	TW11	17-May-08	<325	27000	70400	11100	62500	3720	73500	278000	46300	493000
H08050295	TW12	18-May-08	<1.0	<0.50	0.66	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050295	TW13	18-May-08	<1.0	18	8.1	<0.50	0.63	<1.0	<20	151	<20	157
H08050295	PW1	17-May-08	<400	24800	42800	5070	24100	2070	24700	85700	5010	184000
H08040204	MW1	11-Apr-08	<200	14800	32000	3820	22400	1660	19400	82000	16300	166000
H08050170	MW1	8-May-08	<150	9500	24300	2770	15800	959	12000	56500	5340	110000
H08040204	MW2	13-Apr-08	1.6	0.52	3.1	0.62	5.4	1.8	<20	<20	<20	17
H08040316	MW2	20-Apr-08	<1.0	<0.50	<0.50	<0.50	0.67	<1.0	<20	<20	<20	<20

Table 2
Summary of Groundwater Analytical Data (ug/L)

Lab Report	Sample ID	Collection Date	MTBE	Benzene	Toluene	Ethylbenzene	Xylene	Naphthalene	C9 to C10 Aromatics	C5 to C8 Aliphatics	C9 to C12 Aliphatics	TPH
H08040404	MW2	24-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040429	MW2	28-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050197	MW2	9-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050296	MW2	13-May-08	<1.0	<0.50	0.86	<0.50	0.83	<1.0	<20	<20	<20	<20
H08050384	MW2	21-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050438	MW2	27-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040204	MW3	13-Apr-08	<100	8910	26200	2440	15200	697	6840	92500	7380	139000
H08050197	MW3	8-May-08	<160	7090	20000	2900	17100	1060	23500	61200	6650	120000
H08050197	MW4	9-May-08	<400	29800	55000	5370	25200	1270	20000	118000	2130	223000
H08040316	MW5	18-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050170	MW5	8-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040316	MW6	19-Apr-08	<100	2450	5220	447	2710	130	<2000	9590	2070	19900
H08050197	MW6	9-May-08	<10	554	674	<5.0	487	16	384	1910	56	3520
H08040404	MW7	24-Apr-08	<50	2170	5980	504	2620	138	1380	15600	1180	25700
H08050197	MW7	9-May-08	<50	2130	6680	652	3390	183	1830	10000	211	21700
H08040404	MW8	24-Apr-08	<100	9150	20000	1960	11200	603	6580	86400	8610	126000
H08050197	MW8	9-May-08	<100	8860	23400	2200	12500	687	7300	41600	2360	85600
H08040415	MW9	25-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050197	MW9	9-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08040415	MW10	26-Apr-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20
H08050197	MW10	9-May-08	<1.0	<0.50	<0.50	<0.50	<0.50	<1.0	<20	<20	<20	<20



Winchester, Kentucky

Keller Transport
Polson, Montana

Location Map

Drawing Date: 4 JUN 08

Drawn by: PR

Figure 1



CEDAR CREEK
ENGINEERING
INCORPORATED

Winchester, Kentucky

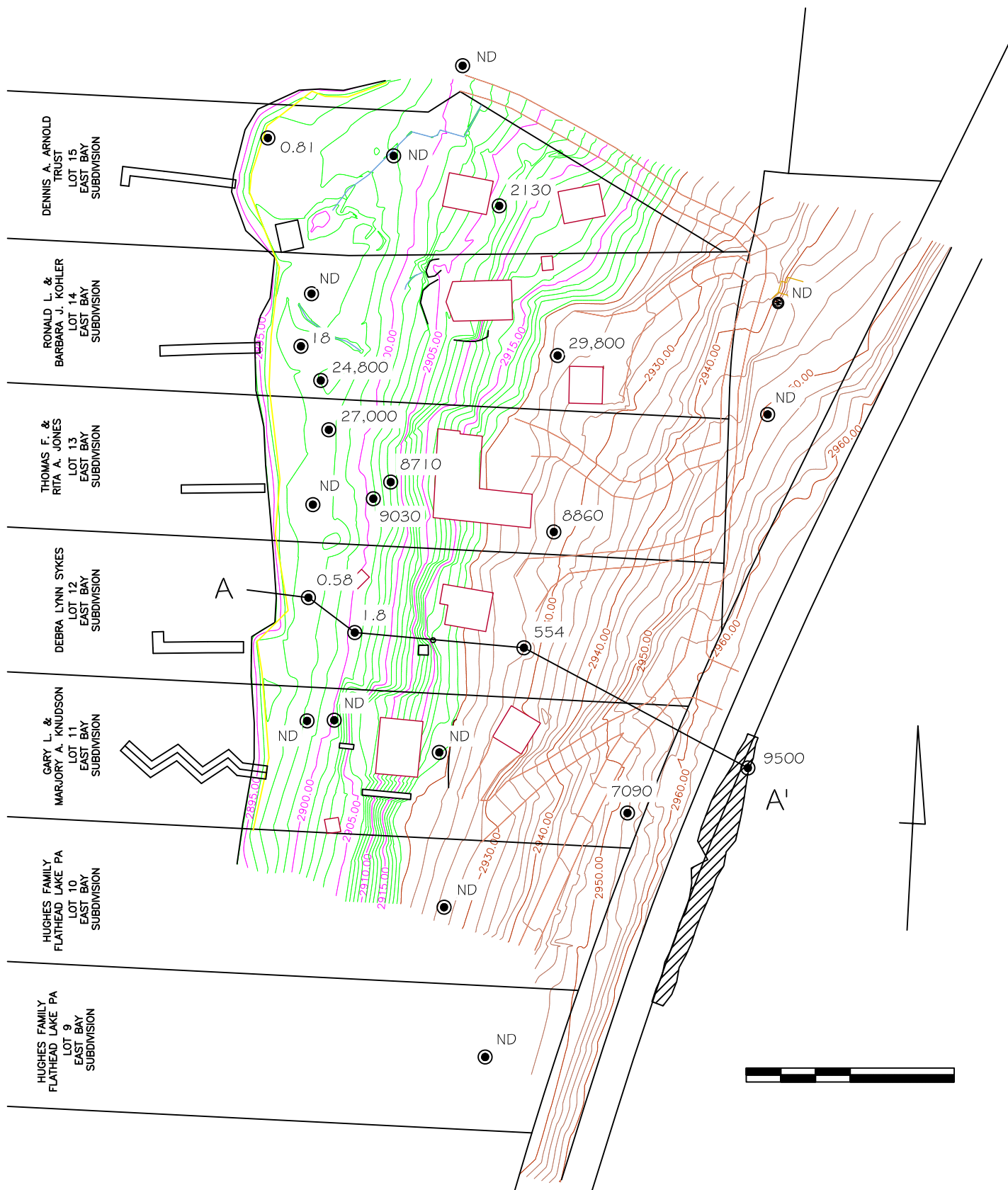
Keller Transport
Polson, Montana

Site Plan

Drawing Date: 4JUN08

Drafted by: PR

Figure 2



CEDAR CREEK
ENGINEERING
INCORPORATED

Winchester, Kentucky

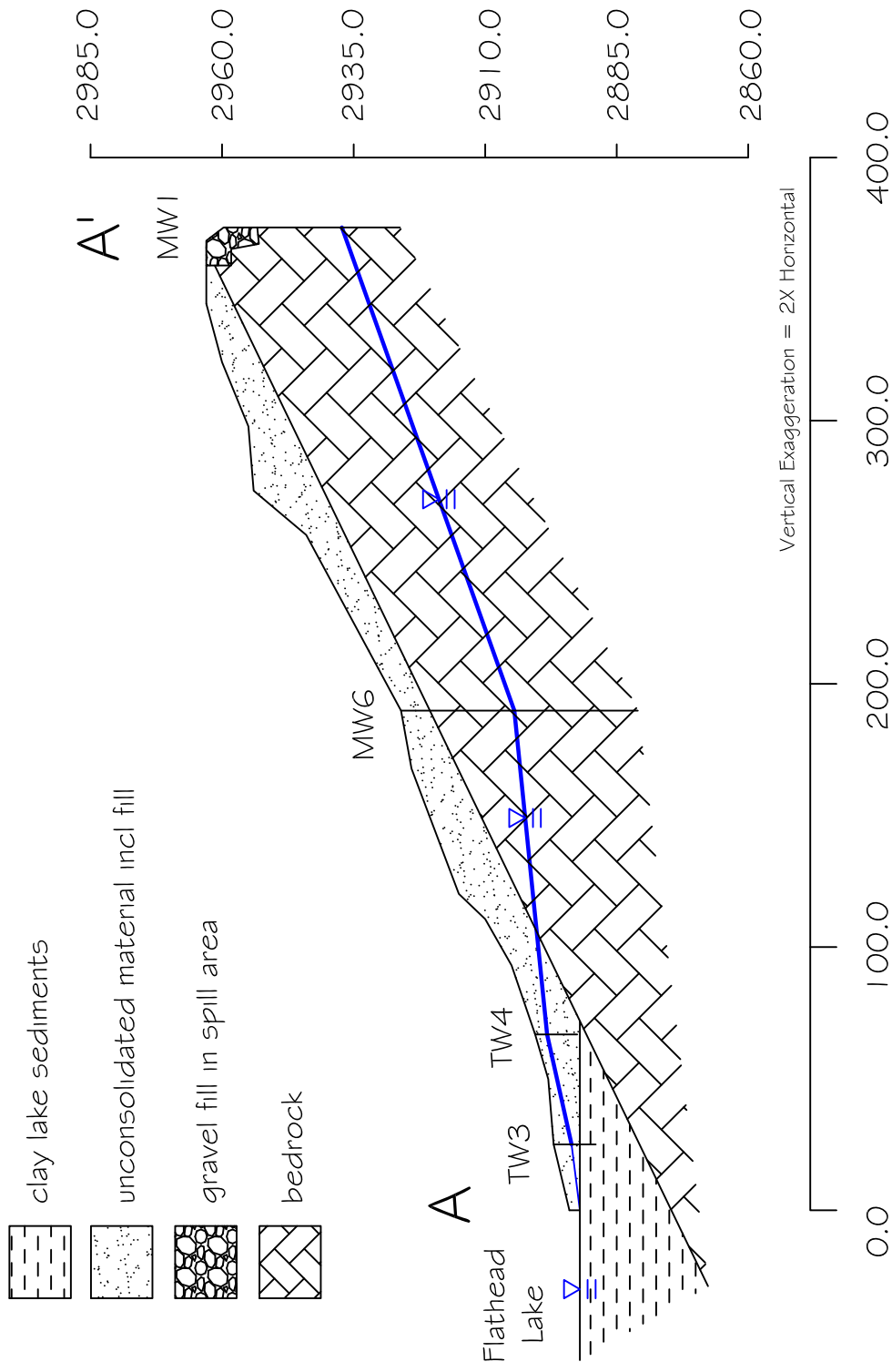
Keller Transport
Polson, Montana

Dissolved Benzene (ug/L)
April - May 2008

Drawing Date: 4JUN08

Drafted by: PR

Figure 3



Winchester, Kentucky

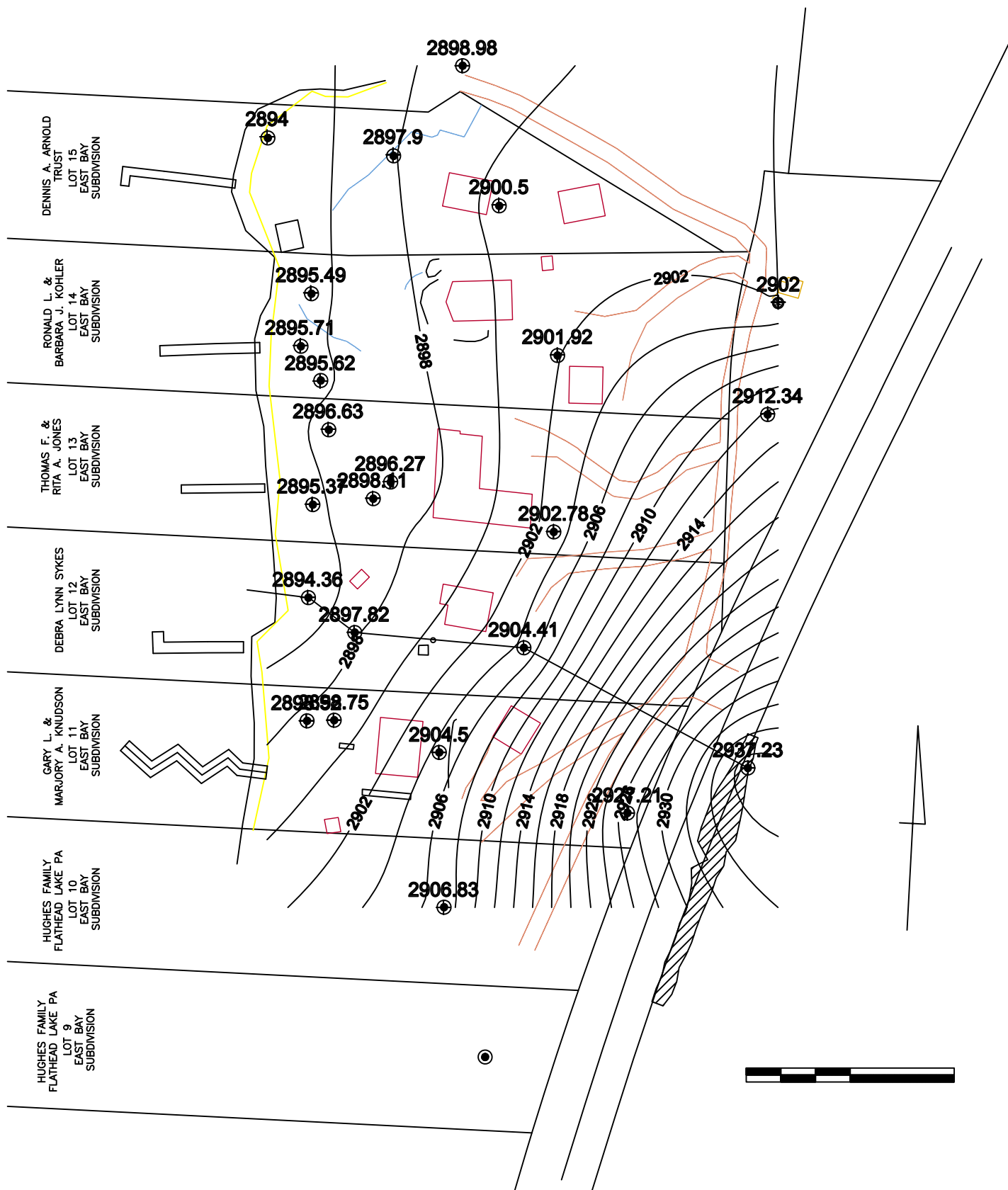
Keller Transport
Polson, Montana

Cross Section A-A'

Drawing Date: 3JUN08

Drafted by: PR

Figure 4



CEDAR CREEK
ENGINEERING
INCORPORATED

Winchester, Kentucky

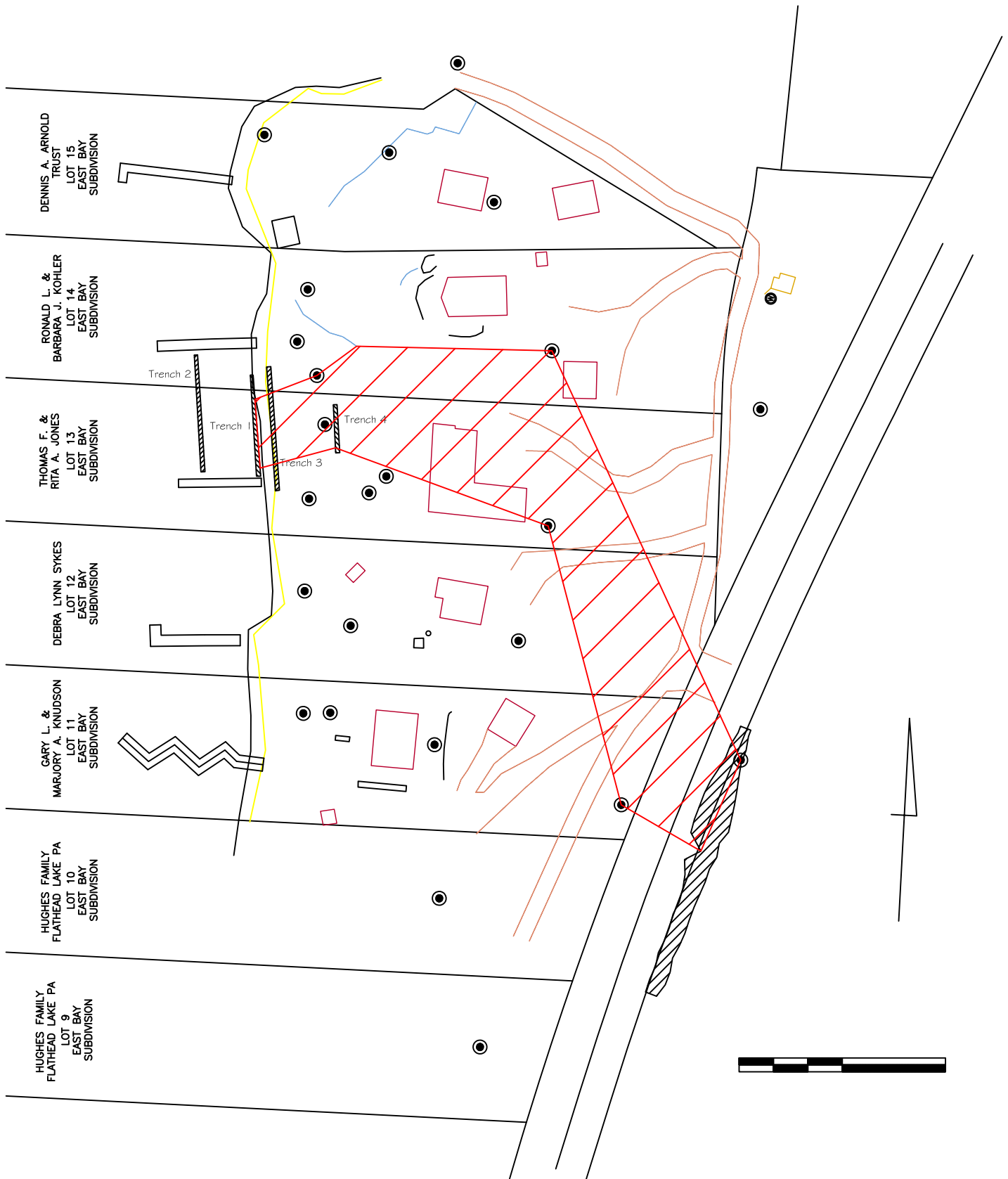
Keller Transport
Polson, Montana

Groundwater
Potentiometric
Surface

Drawing Date: 4JUN08

Drafted by: PR

Figure 5



CEDAR CREEK
ENGINEERING
INCORPORATED

Winchester, Kentucky

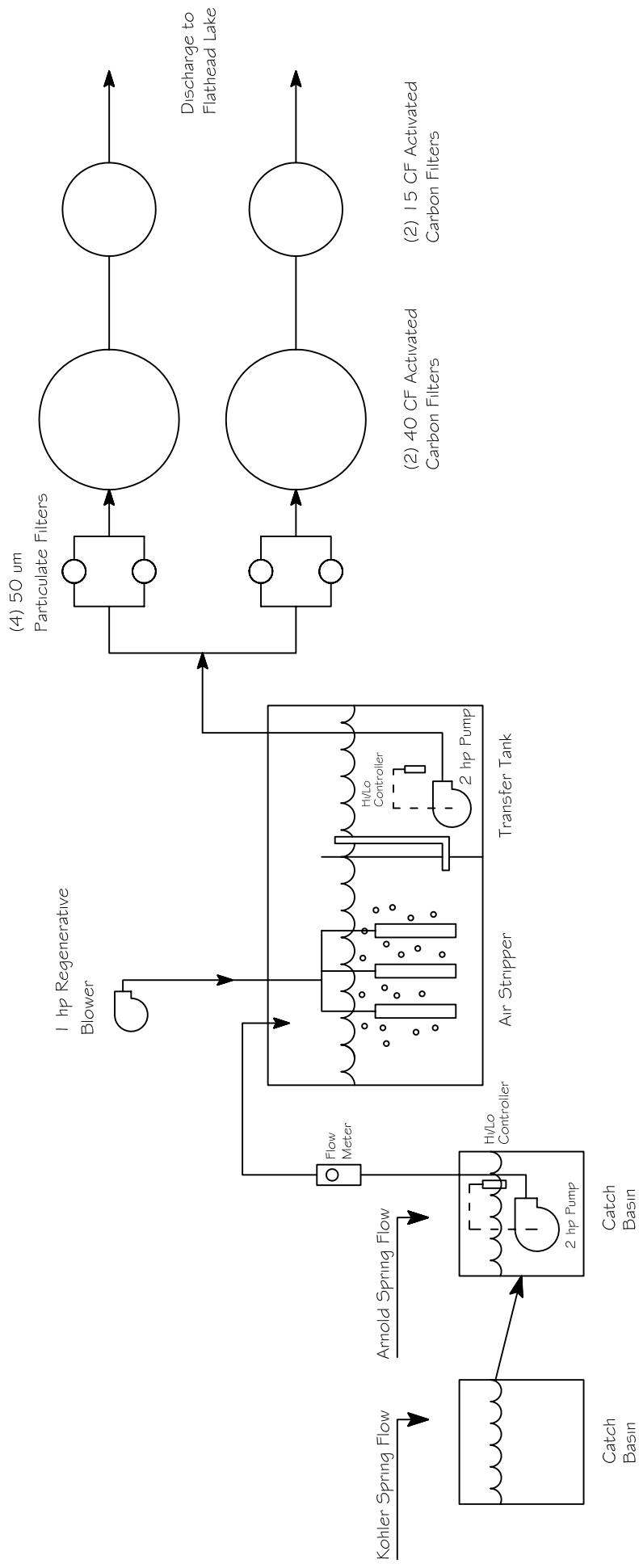
Keller Transport
Polson, Montana

Boundaries of Observed
Free Product /
Trench Locations

Drawing Date: 4JUN08

Drafted by: PR

Figure 6



Winchester, Kentucky

Keller Transport, Inc.
Polson, Montana

Process Flow Diagram

Drawing Date: 29MAY08

Drafted by: PR

Figure 7



Photo 1. 2 April 2008



Photo 2. 3 April 2008



Photo 3. 5 April 2008



Photo 4. 5 April 2008



Photo 5. 4 April 2008.



Photo 6. 4 April 2008



Photo 7. 4 April 2008



Photo 8. 6 April 2008



Photo 9. 8 April 2008



Photo 10. 8 April 2008



Photo 11. Clay lakebed sediments. 8 April 2008.



Photo 12. Drilling MW1. 10 April 2008



Photo 13. Drilling MW2. 12 April 2008.



Photo 14. MW4. 17 April 2008.



Photo 15. Drilling MW6. 17 April 2008.



Photo 16. MW3. 17 April 2008.



Photo 17. Looking north from Arnold spring toward lagoon. 23 April 2008.



Photo 18. Looking south toward spring area. 23 April 2008.



Photo 19. Arnold spring. Arnold house in background. 23 April 2008 .



Photo 20. Kohler spring. 23 April 2008.



Photo 21. Kohler spring. 25 April 2008.



Photo 22. Original system in foreground. Large system being constructed. 25 April 2008.



Photo 23. 25 April 2008.

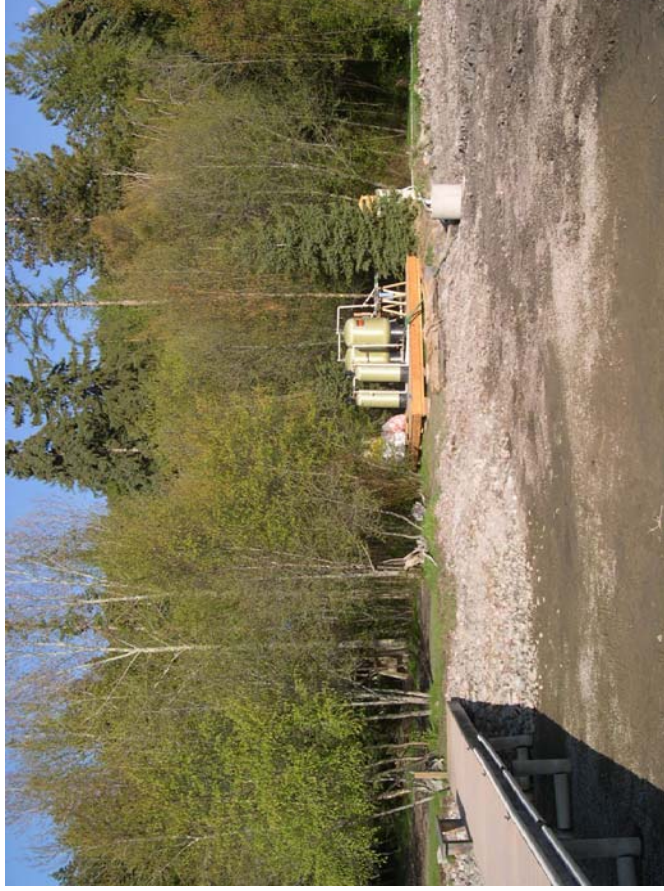


Photo 24. 13 May 2008.



Photo 25. Free product at shoreline of Jones property. 13 May 2008



Photo 26. 13 May 2008.



Photo 27. 13 May 2008.



Photo 28. Trench 1 at right. 18 May 2008.



Photo 29. 18 May 2008.



Photo 30. 18 May 2008.



Photo 31. 18 May 2008.



Photo 32. Trench 2. 19 May 2008



Photo 33. Trench 3. 23 May 2008.



Photo 34. Trench 3. 23 May 2008.



Photo 35. Trench 4. 23 May 2008.



Photo 36. Trench 4. 23 May 2008.



Photo 37. Trench 3. 23 May 2008.



Photo 38. Free product at top of lakebed clay. Trench 3. 23 April 2008.



Photo 39. Fill on top of lakebed clay. Trench 1. 23 May 2008.



Photo 40. Trench 4. 25 May 2008.



Photo 41. 25 May 2008



Photo 42. 25 May 2008.



Photo 43. 29 May 2008.



Photo 44. 29 May 2008.

MONITORING WELL LITHOLOGIC AND COMPLETION LOG

JOB NO:			WELL NO:	MW-2	
PROJECT:	Keller Transport, Polson		STATE:	MT	COUNTY:
				Lake	LOGGED BY:
					B Kucera
LEGAL LOCATION:	T 23N R 19W S 33 TRACT BBD		DESCRIPTIVE LOCATION:	Monitoring Well - Sentinel to PWS well	
DATE STARTED:	4/12/2008		DATE COMPLETED:	4/12/2008	
			DRILLING CO/DRILLER:	Ace Drilling/Jay Bick	
DRILLING METHOD:	Air Rotary		BOREHOLE DIAM (IN):	8"	
			DRILL FLUIDS USED:	Air	
TOTAL DEPTH DRILLED:	80	TOTAL DEPTH CASSED:	80	INTERVAL PERFORATED FROM OR SCREENED (FT.):	25 80
				DIAMETER:	4" sch 40
				CASING TYPE:	Bell end PVC
METHOD OF PERFORATION:	<input type="checkbox"/> Open Hole <input type="checkbox"/> Open Bottom <input type="checkbox"/> Saw Slotted <input checked="" type="checkbox"/> Factory 0.025 (size) <input type="checkbox"/> Other		DURING WELL CONSTRUCTION WAS/WERE:		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input checked="" type="checkbox"/> Well Developed <input checked="" type="checkbox"/> Well Pumped <input checked="" type="checkbox"/> Water Samples Collected <input checked="" type="checkbox"/> Material Samples Collected		
ANNULAR COMPLETION CHARACTERISTICS					
WELL PROTECTOR:	LENGTH:	13"	SURFACE SEAL TYPE:	Concrete	FROM: 0 TO: 2
	DIAM:	8"	BACKFILL MATERIAL:	# 15 Bentonite	FROM: 2 TO: 23
LOCK NO:			FILTER PACK TYPE:	10/20 Sand	FROM: 23 TO: 80
STATIC WATER LEVEL:	DATE:	4/12/2008	MEASURING POINT DESCRIPTION/ELEVATION:	Ground surface	
40				MEASURING POINT RELATIVE TO GROUND SURFACE (+/-)	
REMARKS:					

INTERVAL(FT)	LITHOLOGIC DESCRIPTION	REMARKS	
		INTERVAL (FT)	HEADSPACE (ppm)
below ground surface			
0-4	GP, unconsolidated Olive-gray, moist, loose silt w/ coarse sands & fine gravels	0-4	2.8
4	Bedrock contact Soft rock, weathered surface	4-10	0.5
4-6	Weathered	10-13.5	0.6
6-10	Competent rock, Solid. will set casing & go open hole to TD because can't set casing in rock w/o over reaming, will go to 34' and reassess	13.5-17	0.5
6-10	Rock - Light gray/silver, hard , no odor	17.5-20	0.3
10-13.5	Fractures, clay Altered Soft Rock Silts in Frac. Yellow-gray medium gravel chip size some sub rounded	20-23	0.2
13.5-17	Rock - Light gray silver hard, no odor	23-27	0.3
17-17.5	Clay altrd frac. Zone. Yellow-gray, soft zone silted	27-28.5	0.6
17.5-19.5	Rock - Light gray silver hard, slight odor	28.5-36.5	0.6
19.5-20	Frac clay altered, silts in frac. Soft rock zone. Yellow-gray, medium gravels subrounded. (Moist)	36.5-43	0.4
20-21	Rock -light gray, dry	43-54	0.5
21-21.5	Frac. Clay altered/silted. Yellow gray, slight odor (Moist)	54-60	0.2
21.5-23	Rock dry light gray-silver, hard. All chips angular bit results		
23-27	Rock dry "same as above"		
27-28.5	Frac zone - still sig. Fines in frac. very soft zones yellow-gray no odor (moist, clay will smear)		
28.5-36	Rock light gray, (dry)		
36-36.5	Frac. Yellow		
36.5-43	Rock, hard dry - see above		
43-54	Same as above		
54-	Frac. Soft zone. Dry		
55	Very moist not sat. clays smear and dust in cutting is low to non-existent		
55-60	Saturated zone (may extend - current depth) Frac zone less fines mud result of cutting dusts		
60-63.5	Frac zone More water yield chips have little to no fines all chip material very angular		
63.5-65	Frac. Zone Few-no fines, some sub-rounded material & mineralized calciums/clorenchate on sub rounded particles. Indicate water flows in this zone and exper. periodic movement/grinding of materials		
65-70	Same as above		
70-80	Same as above		
80-TD	starting to see clays. Clumpy clays, yellow, smear. Drillers pause to get WL in Boring Statre WL=40' bgs		

MONITORING WELL LITHOLOGIC AND COMPLETION LOG

JOB NO: _____		WELL NO: <u> MW3 </u>	
PROJECT: <u> Keller Transport, Polson </u>	STATE: <u> MT </u>	COUNTY: <u> Lake </u>	LOGGED BY: <u> B Craig </u>
LEGAL LOCATION: <u> T 23N R 19W S 33 TRACT BBD </u>		DESCRIPTIVE LOCATION: <u> Directly across highway from spill on Knudson's property </u>	
DATE STARTED: <u> 4/11/2008 </u>	DATE COMPLETED: <u> 4/11/2008 </u>	DRILLING CO/ DRILLER: <u> Ace Drilling/ Jay Bick </u>	
DRILLING METHOD: <u> Air Rotary </u>	BOREHOLE DIAM (IN): <u> 8 </u>	DRILL FLUIDS USED: <u> Air </u>	
TOTAL DEPTH DRILLED: <u> 37 </u>	TOTAL DEPTH CASSED: <u> 34 </u>	INTERVAL PERFORATED FRO OR SCREENED (FT.): <u> 20 </u> <u> 34 </u>	DIAMETER: <u> 4" sch 40 </u> CASING TYP <u> Bell end PVC </u>
METHOD OF PERFORATION: _____	DURING WELL CONSTRUCTION WAS/WERE:		YES NO
_____ Open Hole	Well Developed		<input checked="" type="checkbox"/> <input type="checkbox"/>
_____ Open Bottom	Well Pumped		<input checked="" type="checkbox"/> <input type="checkbox"/>
_____ Saw Slotted	Water Samples Collected		<input checked="" type="checkbox"/> <input type="checkbox"/>
<input checked="" type="checkbox"/> Factory .0025 (size)	Material Samples Collected		<input checked="" type="checkbox"/> <input type="checkbox"/>
_____ Other _____			
ANNULAR COMPLETION CHARACTERISTICS			
WELL PROTECTOR: _____	LENGTH: <u> 13" </u>	SURFACE SEAL TYPE: <u> Concrete </u>	FROM: 0 TO: 2
	DIAM: <u> 8" </u>	BACKFILL MATERIAL: <u> #15 Bentonite </u>	FROM: 2 TO: 19
LOCK NO: _____		FILTER PACK TYPE: <u> 10/20 Sand </u>	FROM: 19 TO: 34
STATIC WATER LEVEL: <u> 28.7 </u>	DATE: <u> 4/10/2008 </u>	MEASURING POINT DESCRIPTION/ ELEVATION: <u> Ground surface </u>	MEASURING POINT RELATIVE TO GROUND SURFACE (+/-) _____
REMARKS: <u> 3 foot of slough in hole. </u>			

INTERVAL(FT)	LITHOLOGIC DESCRIPTION	REMARKS	
		INTERVAL (FT)	HEADSPACE (ppm)
below ground surface			
0-2	Topsoil, dark brown, moist, no odor	9.5	3.1
2-4	Bedrock, weathered gray grading to gray-green hard/competent	15	0.6
4-5	Hard bedrock, dark gray, dry, no HC odor	25	0.1
5-10	Weathered pale yellow alteration zone, dry, no HC odor	29	3.3
10-12.5	Same as above	31	24.6
12.5-15	Hard competent bedrock, dark greenist gray, dry, no HC odor	35	5.4
15-20	Same as above		
20-25	Same as above		
25-29	Hard competent bedrock, no HC odor, dry		
29	Hard competent bedrock, gray, faint gasoline odor, saturated		
30-33.5	Yellow tan alteration zone, HC odor (strong) (H2O @ 30)		
33.5-37	Hard competent bedrock, no water, faint gasoline odor		

JOB NO:				WELL NO:		MW-4	
PROJECT:		Keller Transport, Polson		STATE: MT		COUNTY: Lake	
						LOGGED BY: D May	
LEGAL LOCATION:				DESCRIPTIVE LOCATION:			
T 23N R 19W S 33 TRACT BBD				Just (4') from steps to upatairs Garage, Ron Kohler property			
DATE STARTED:		4/15/2008		DATE COMPLETED:		4/16/2008	
				DRILLING CO/ DRILLER:		Ace Drilling/Jay Bick	
DRILLING METHOD		Air Rotary		BOREHOLE DIAM (IN):		8"	
				DRILL FLUIDS USED:		Air, H2O	
TOTAL DEPTH DRILLED:		42.5		TOTAL DEPTH CASED:		42.5	
				INTERVAL PERFORATED FROM OR SCREENED (FT.):		12 42.5	
				DIAMETER: CASING TYPE:		4" sch 40 Bell end PVC	
METHOD OF PERFORATION:		Open Hole		DURING WELL CONSTRUCTION WAS/WERE:		YES	
		Open Bottom		Well Developed		NO	
		Saw Slotted		Well Pumped			
		Factory 0.025 (size)		Water Samples Collected			
		Other		Material Samples Collected			
ANNULAR COMPLETION CHARACTERISTICS							
WELL PROTECTOR:		LENGTH: 13"		SURFACE SEAL TYPE:		Concrete	
		DIAM: 8"		BACKFILL MATERIAL:		#15 Bentonite	
LOCK NO:				FILTER PACK TYPE:		10/20 Sand	
						FROM: 0 TO: 2	
						FROM: 2 TO: 11	
						FROM: 11 TO: 42.5	
STATIC WATER LEVEL:		DATE:		MEASURING POINT DESCRIPTION/ ELEVATION:		MEASURING POINT RELATIVE TO GROUND SURFACE (+/-) +2.45	
25.89		4/17/2008		Top od PVC			
REMARKS: 4-16-08 Jay thinks upper 9' was more fractured than the rest of the well							

[illegible]

JOB NO:				WELL NO:		MW-5					
PROJECT:		Keller Transport, Polson		STATE: MT		COUNTY: Lake		LOGGED BY:		D May	
LEGAL LOCATION: T 23N R 19W S 33 TRACT BBD				DESCRIPTIVE LOCATION: On Hughes Family Parcel, just S of Knudson property							
DATE STARTED:		4/16/2008		DATE COMPLETED:		4/17/2008		DRILLING CO/ DRILLER:		Ace Drilling/Jay Bick	
DRILLING METHOD		Air Rotary		BOREHOLE DIAM (IN):		8"		DRILL FLUIDS USED:		Air	
TOTAL DEPTH DRILLED:		35		TOTAL DEPTH CASED:		34.5		INTERVAL PERFORATED FROM OR SCREENED (FT.):		9.5 34.5	
								DIAMETER: CASING TYPE:		4" sch 40 Bell end PVC	
METHOD OF PERFORATION: Open Hole Open Bottom Saw Slotted ✓ Factory 0.025 (size) Other				DURING WELL CONSTRUCTION WAS/WERE: Well Developed Well Pumped Water Samples Collected Material Samples Collected				YES		NO	
								✓			
								✓			
								✓			
								✓			
ANNULAR COMPLETION CHARACTERISTICS											
WELL PROTECTOR:		LENGTH: 13"		SURFACE SEAL TYPE:		Concrete		FROM: 0		TO: 2	
		DIAM: 8"		BACKFILL MATERIAL:		#15 Bentonite		FROM: 2		TO: 8.5	
LOCK NO:				FILTER PACK TYPE:		10/20 Sand		FROM: 8.5		TO: 34.5	
STATIC WATER LEVEL:		DATE:		MEASURING POINT DESCRIPTION/ ELEVATION:				MEASURING POINT RELATIVE TO GROUND SURFACE (+/-)			
20.5		4/17/2008		Ground surface							
REMARKS:											

[illegible]

MONITORING WELL LITHOLOGIC AND COMPLETION LOG

JOB NO: _____ WELL NO: MW-6

PROJECT: Keller Transport, Polson STATE: MT COUNTY: Lake LOGGED BY: D May

LEGAL LOCATION: T 23N R 19W S 33 TRACT BBD DESCRIPTIVE LOCATION: On Sykes property ≈ 35' E of front porch

DATE STARTED: 4/17/2008 DATE COMPLETED: 4/18/2008 DRILLING CO/DRILLER: Ace Drilling/Jay Bick

DRILLING METHOD: Air Rotary BOREHOLE DIAM (IN): 8" DRILL FLUIDS USED: Air, H2O

TOTAL DEPTH DRILLED: 50 TOTAL DEPTH CASED: 45 INTERVAL PERFORATED FROM 15' OR SCREENED (FT.): 45' DIAMETER: 4" sch 40 CASING TYPE: Bell end PVC

METHOD OF PERFORATION: _____ DURING WELL CONSTRUCTION WAS/WERE: YES NO

_____ Open Hole	Well Developed	<u>✓</u>	
_____ Open Bottom	Well Pumped	<u>✓</u>	
_____ Saw Slotted	Water Samples Collected	<u>✓</u>	
<u>✓</u> Factory <u>.0025</u> (size)	Material Samples Collected	<u>✓</u>	
_____ Other _____			

ANNULAR COMPLETION CHARACTERISTICS

WELL PROTECTOR: _____ LENGTH: 13" SURFACE SEAL TYPE: Concrete FROM: 0 TO: 2

LOCK NO: _____ DIAM: 8" BACKFILL MATERIAL: #15 Bentonite FROM: 2 TO: 13.5

STATIC WATER LEVEL: 39' DATE: 4/18/2008 MEASURING POINT DESCRIPTION/ELEVATION: Ground surface MEASURING POINT RELATIVE TO GROUND SURFACE (+/-)

REMARKS: Hole caved / sloughed to 45'

INTERVAL(FT)	LITHOLOGIC DESCRIPTION	REMARKS	
		INTERVAL (FT)	HEADSPACE (ppm)
below ground surface			
0-5.5	GM Gravels rounded to 50mm in silt tan/gray	5-10	1.4
5.5-9.5	Bedrock, light gray	10-15	1.1
9.5-24.5	Bedrock light gray pretty fractured	15-20	1.0
	less fractures @ 13'	20-25	1.3
24.5-25.5	Bedrock - Yellow/orange -softer (driller)	25-30	2.0
25.5-33	Bedrock light gray minor fractures if any	30-35	1.8
33-41.5	Bedrock yellow orange soft (driller)	35-40	2.6
	Moist @ 36.5 Wet @ 40		
41.5-49	Light gray/yellow orange Bedrock - soft (fractured)		
	making < .1gpm more competent (< fractures @ 49')		
49-50	Bedrock light gray hard - competent		

MONITORING WELL LITHOLOGIC AND COMPLETION LOG

JOB NO: _____ WELL NO: MW-7

PROJECT: Keller Transport, Polson STATE: MT COUNTY: Lake LOGGED BY: D May

LEGAL LOCATION: T 23N R 19W S 33 TRACT BBD DESCRIPTIVE LOCATION: On Arnold's property between house and garage

DATE STARTED: 4/18/2008 DATE COMPLETED: 4/21/2008 DRILLING CO/DRILLER: Ace Drilling/Jay Bick

DRILLING METHOD: Air Rotary BOREHOLE DIAM (IN): 8" DRILL FLUIDS USED: Air, H2O

TOTAL DEPTH DRILLED: 50 TOTAL DEPTH CASSED: 50 INTERVAL PERFORATED FROM 5 OR SCREENED (FT:)50 DIAMETER: 4" sch 40 CASING TYPE: PVC Bell end

METHOD OF PERFORATION: _____ Open Hole _____ Open Bottom _____ Saw Slotted _____ ☒ Factory (size) _____ Other _____

DURING WELL CONSTRUCTION WAS/WERE: YES NO
 Well Developed ☒ ☐
 Well Pumped ☒ ☐
 Water Samples Collected ☒ ☐
 Material Samples Collected ☒ ☐

ANNULAR COMPLETION CHARACTERISTICS

WELL PROTECTOR: _____ LENGTH: 13" SURFACE SEAL TYPE: Concrete FROM: 0 TO: 2
 LOCK NO: _____ DIAM: 8" BACKFILL MATERIAL: #15 Bentonite FROM: 2 TO: 4.5
 FILTER PACK TYPE: 10/20 Sand FROM: 4.5 TO: 50

STATIC WATER LEVEL: 7.2 DATE: 4/21/2008 MEASURING POINT DESCRIPTION/ELEVATION: Ground surface MEASURING POINT RELATIVE TO GROUND SURFACE (+/-)

REMARKS: _____

INTERVAL(FT)	LITHOLOGIC DESCRIPTION	REMARKS	
		INTERVAL (FT)	HEADSPACE (ppm)
below ground surface			
0-.5	Organics/ Topsoil	0-3.5	1.2
.5-3.5	GM Gravels rounded to 40mm in sand olive grey, fine to medium grain, moist	3.5-5	1.1
3.5-5.5	Bedrock light gray, numerous fractures	5-10	1.6
5.5-15.5	As above minor fractures based on Rig, Hard drilling	10-15	1.1
15.5-16	Bedrock light gray, Soft, fractured based on Rig	15-20	1.3
16-50	as above minor fractures, Hard drilling	20-25	1.1
	19.5-20 Soft zone based on Rig	25-30	1.6
	16"-28" Soft zone based on Rig	30-35	1.3
		35-40	1.2
		40-45	1.1
		45-50	1.2

JOB NO:				WELL NO:		MW-8																													
PROJECT:		Keller Transport, Polson		STATE: MT		COUNTY: Lake		LOGGED BY:		D May																									
LEGAL LOCATION:				DESCRIPTIVE LOCATION:				≈ 18' E of S E corner Jones residence																											
T 23N R 19W S 33				TRACT BBD																															
DATE STARTED:				4/22/2008				DATE COMPLETED:				4/22/2008				DRILLING CO/ DRILLER:				Ace Drilling/Jay Bick															
DRILLING METHOD				Air Rotary				BOREHOLE DIAM (IN):				8"				DRILL FLUIDS USED:				Air															
TOTAL DEPTH DRILLED:				40				TOTAL DEPTH CASED:				38.5				INTERVAL PERFORATED FROM OR SCREENED (FT.):				8.5 38.5				DIAMETER: 4" sch 40				CASING TYPE:				Bell end PVC			
METHOD OF PERFORATION:				Open Hole				Well Developed				YES				NO																			
				Open Bottom				Well Pumped																											
				Saw Slotted				Water Samples Collected																											
				Factory 0.025 (size)				Material Samples Collected																											
				Other																															
ANNULAR COMPLETION CHARACTERISTICS																																			
WELL PROTECTOR:				LENGTH: 13"				SURFACE SEAL TYPE:				Concrete				FROM: 0				TO: 2															
				DIAM: 8"				BACKFILL MATERIAL:				#15 Bentonite				FROM: 2				TO: 8.5															
LOCK NO:								FILTER PACK TYPE:				10/20 Sand				FROM: 8.5				TO: 38.5															
STATIC WATER LEVEL:				26.88				DATE: 4/23/2008				MEASURING POINT DESCRIPTION/ ELEVATION:				Ground surface				MEASURING POINT RELATIVE TO GROUND SURFACE (+/-)															
REMARKS:																																			

[illegible]

MONITORING WELL LITHOLOGIC AND COMPLETION LOG

JOB NO: _____ WELL NO: MW-9

PROJECT: Keller Transport, Polson STATE: MT COUNTY: Lake LOGGED BY: D May

LEGAL LOCATION: T 23N R 19W S 33 TRACT BCA DESCRIPTIVE LOCATION: On E side of road, Southern Hughes property

DATE STARTED: 4/23/2008 DATE COMPLETED: 4/24/2008 DRILLING CO/DRILLER: Ace Drilling/Jay Bick

DRILLING METHOD: Air Rotary BOREHOLE DIAM (IN): 8" DRILL FLUIDS USED: Air

TOTAL DEPTH DRILLED: 50 TOTAL DEPTH CASED: 50 INTERVAL PERFORATED FROM 18 OR SCREENED (FT:): 50 DIAMETER: 4" sch 40 CASING TYPE: Bell end PVC

METHOD OF PERFORATION: _____ DURING WELL CONSTRUCTION WAS/WERE: _____

	YES	NO
Open Hole	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Open Bottom	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Saw Slotted	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Factory <u>0.025</u> (size)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>

Well Developed ☒ Well Pumped ☒ Water Samples Collected ☒ Material Samples Collected ☒

ANNULAR COMPLETION CHARACTERISTICS

WELL PROTECTOR: _____ LENGTH: 13" SURFACE SEAL TYPE: Concrete FROM: 0 TO: 2

DIAM: 8" BACKFILL MATERIAL: #15 Bentonite FROM: 2 TO: 16

LOCK NO: _____ FILTER PACK TYPE: 10/20 Sand FROM: 16 TO: 50

STATIC WATER LEVEL: 28 DATE: 4/24/2008 MEASURING POINT DESCRIPTION/ELEVATION: Ground surface MEASURING POINT RELATIVE TO GROUND SURFACE (+/-) _____

REMARKS: _____

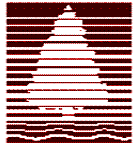
INTERVAL(FT)	LITHOLOGIC DESCRIPTION	REMARKS	
		INTERVAL (FT)	HEADSPACE (ppm)
below ground surface			
0-2	Topsoil, Organics	0-5	0.9
.2-4	Silt, tan	5-10	1.0
4-6.5	GM Gravels rounded to 30mm in sand Tan, Fine grain	10-15	1.3
6.5-15	Bedrock - soft, fractures yellow/orange	15-20	1.2
15-22	Bedrock, light gray, very minor fractures, Hard	20-25	1.4
22-26	Bedrock, yellow/orange, Fractured (softer)	25-30	1.6
26-31	Bedrock light gray, Hard, less fractures	30-35	1.2
31-38	Bedrock, yellow/orange, Fractured	35-40	1.1
38-39	Bedrock, light gray, harder, less fractured	40-45	1.0
41-47	Bedrock, yellow orange, softer - more fractures	45-50	1.3
47-50	Bedrock, light gray, Hard, less fractures		

JOB NO:		WELL NO: MW10	
PROJECT: Keller Transport, Polson		STATE: MT	COUNTY: Lake
LOGGED BY: J Bick			
LEGAL LOCATION: T 23N R 19W S 33 TRACT BBD		DESCRIPTIVE LOCATION: Knudson Property West	
DATE STARTED: 4/24/2008		DATE COMPLETED: 4/25/2008	
DRILLING METHOD: Air Rotary		DRILLING CO/ DRILLER: Ace Drilling/ Jay Bick	
BOREHOLE DIAM (IN): 8		DRILL FLUIDS USED: air	
TOTAL DEPTH DRILLED: 42	TOTAL DEPTH CASSED: 42	INTERVAL PERFORATED FROM OR SCREENED (FT.): 15 42	DIAMETER: 4" sch 40 CASING TYP: Bell end PVC
METHOD OF PERFORATION:		DURING WELL CONSTRUCTION WAS/WERE:	
Open Hole		YES NO	
Open Bottom		✓	
Saw Slotted		✓	
✓ Factory 0.025 (size)		✓	
Other		✓	
ANNULAR COMPLETION CHARACTERISTICS			
WELL PROTECTOR:	LENGTH: 13"	SURFACE SEAL TYPE:	
DIAM: 8"		BACKFILL MATERIAL: # 15 Bentonite FROM: 0 TO: 14	
LOCK NO:		FILTER PACK TYPE: 10/20 Sand FROM: 14 TO: 42	
STATIC WATER LEVEL: 25	DATE: 4/25/2008	MEASURING POINT DESCRIPTION/ ELEVATION: Ground surface	MEASURING POINT RELATIVE TO GROUND SURFACE (+/-)
REMARKS:			

[illegible]

WELL LOG

TW1



CEDAR CREEK
ENGINEERING
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

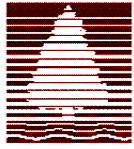
Drilling Date: **14 May 2008**

Casing Rim Elevation: **2898.87**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screen Interval: **2-8 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil and clay	1535		
2 - 4	gray silty clay	27.5		
4 - 6	gray silty clay	19.3		
6 - 8	gray and brown silty clay	12.3		

WELL LOG

TW2



CEDAR CREEK
ENGINEERING
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

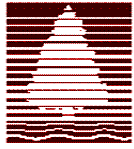
Drilling Date: **14 May 2008**

Casing Rim Elevation: **2905.83**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-8 feet**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil and clay	3.7		
2 - 4	gray silty clay	7.4		
4 - 6	gray silty clay	319		
6 - 8	gray and brown silty clay	387		

WELL LOG

TW3



CEDAR CREEK
ENGINEERING
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

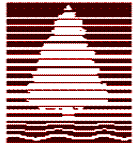
Drilling Date: **14 May 2008**

Casing Rim Elevation: **2898.86**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-8 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil and clay	2.7		
2 - 4	brown clay	2.0		
4 - 6	brown, wet clay	2.2		
6 - 8	brown, wet clay	0.7		

WELL LOG

TW4



CEDAR CREEK
ENGINEERING
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

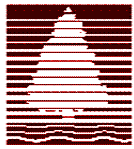
Drilling Date: **14 May 2008**

Casing Rim Elevation: **2902.16**
Depth to Bottom of Well: **7.5 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-7.5 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	11.4		
2 - 4	gray and brown silty clay	2.7		
4 - 6	gray and brown silty clay	3.0		
6 - 8	gray and brown silty clay	2.3		

WELL LOG

TW5



**CEDAR CREEK
ENGINEERING**
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

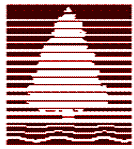
Drilling Date: **15 May 2008**

Casing Rim Elevation: **2899.31**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-8 feet**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	0.0		
2 - 4	topsoil and gray clay	0.0		
4 - 6	wet, dark brown clay with sand	0.0		
6 - 8	wet, dark brown clay with sand	0.0		

WELL LOG

TW6



**CEDAR CREEK
ENGINEERING**
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

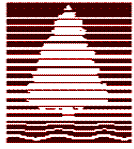
Drilling Date: **15 May 2008**

Casing Rim Elevation: **2901.58**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-6 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	0.8		
2 - 4	topsoil and gray clay	0.3		
4 - 6	wet, gray and brown clay	0.0		
6 - 8	wet, gray and brown clay	0.0		

WELL LOG

TW7



CEDAR CREEK
ENGINEERING
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

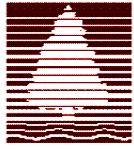
Drilling Date: **15 May 2008**

Casing Rim Elevation: **2900.26**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-8 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	0.0		
2 - 4	topsoil and gray clay	0.0		
4 - 6	topsoil and gray clay	0.3		
6 - 8	very wet, brown clay	0.0		

WELL LOG

TW8



**CEDAR CREEK
ENGINEERING**
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

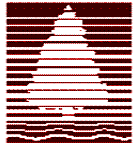
Drilling Date: **15 May 2008**

Casing Rim Elevation: **2899.37**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-8 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	0.0		
2 - 4	brown clay	0.0		
4 - 6	brown clay	0.0		
6 - 8	wet, brown clay	0.0		

WELL LOG

TW9



**CEDAR CREEK
ENGINEERING**
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

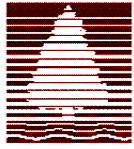
Drilling Date: **15 May 2008**

Casing Rim Elevation: **2901.53**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-8 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	3.1		
2 - 4	topsoil and clay	1.3		
4 - 6	topsoil and clay	0.0		
6 - 8	very wet, topsoil and clay	0.0		

WELL LOG

TW10



CEDAR CREEK
ENGINEERING
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

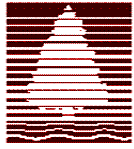
Drilling Date: **16 May 2008**

Casing Rim Elevation: **2902.09**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **2-8 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	4.6		
2 - 4	wet, brown clay	3.2		
4 - 6	clay with gravel	4.1		
6 - 8	clay with gravel	0.0		

WELL LOG

TW11



CEDAR CREEK
ENGINEERING
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Geo Logic**
324 Spickert Knob Road
New Albany, IN 47150

Logged By: **Paul Rodgers**

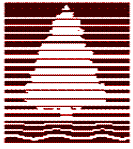
Drilling Date: **16 May 2008**

Casing Rim Elevation: **2898.72**
Depth to Bottom of Well: **8 ft.**
Borehole Diameter: **5.5-inch OD**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **6-8 ft**

Depth Interval(ft)	Description	PID		
0 - 2	wet, dark brown silty clay	94		
2 - 4	clay with topsoil	117		
4 - 6	wet, tan brown clay	135		
6 - 8	wet, tan brown clay	144		

WELL LOG

TW12



**CEDAR CREEK
ENGINEERING**
INCORPORATED

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Cedar Creek Engineering**

installed using hand auger

Logged By: **Paul Rodgers**

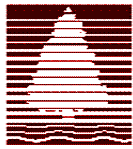
Drilling Date: **17 May 2008**

Casing Rim Elevation: **2898.81**
Depth to Bottom of Well: **3.50**
Borehole Diameter: **3.5**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **0-3.5 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	0.0		
2 - 3.5	gray clay	0.0		

WELL LOG

TW13



**CEDAR CREEK
ENGINEERING**
I N C O R P O R A T E D

Site Identification: **Keller - Polson**
Mile Marker 5.2 Route 35
Polson, MT 59860

Drilling Company: **Cedar Creek Engineering**

installed using hand auger

Logged By: **Paul Rodgers**

Drilling Date: **17 May 2008**

Casing Rim Elevation: **2898.85**
Depth to Bottom of Well: **3.5 ft**
Borehole Diameter: **3.5 in**
Well Diameter: **2-inch OD**
Screen Slot Size: **0.010 inches**
Screened Interval: **0-3.5 ft**

Depth Interval(ft)	Description	PID		
0 - 2	topsoil	0.0		
2 - 3.5	gray clay	1.9		

